

CLAIMS: We claim:

1) A method for extracting binary age category information of a person from his or her facial image comprising means for;

- a) acquiring a digital image,
- b) applying a face extraction process to extract a face region of said person from said digital image,
- c) processing said face region to extract face features, and
- d) processing said face features obtained from said face region using classification techniques for binary age category identification,

whereby said face region is the collection of digital image pixels that encompass the face of said person in said digital image,

whereby said face features are a representation of said face region as direct pixel information or any representations obtained by transformation into other spaces by algebraic manipulation

whereby the binary age categories can be any partition of the entire age spectrum into two groups.

2) The method according to claim 1, wherein said means for processing said face region to extract said face features further comprises steps of applying algebraic space transformations,

whereby examples of said algebraic space transformations can be Principal Component Analysis, Independent Component Analysis, Non-negative Matrix Factorization or gray-scale values of the facial regions.

- 3) The method according to claim 1, wherein said means for binary age category identification comprises a single or a plurality of classifiers, whereby the classifiers can be any pattern classification techniques, for example k-means clustering, and whereby said plurality of classifiers differ from each other by any of the processes for extracting said face features or the steps for building a classifier or the training parameters of said classifier or a combination of the above said.
- 4) The method according to claim 3, wherein said single or plurality of classifiers comprise a combination of two or more steps of
 - a) collecting data
 - b) training of classifier using cross-validation
 - c) bootstrapping to obtain the best classifier, or
 - d) testing the classifier.
- 5) The method according to claim 3, wherein said plurality of classifiers are arranged in serial,

whereby the arrangement in serial can be any sequential ordering of the plurality of classifiers, and

whereby the errors from one classifier can be detected by the next classifier in the sequence, thus improving the accuracy of the classification method.

- 6) The method according to claim 3, wherein said plurality of classifiers are arranged in parallel,

whereby the errors from one classifier can be detected by the other classifiers in parallel, thus improving the accuracy of the classification method.
- 7) The method according to claim 5, wherein the order of the classifiers could be interchanged.
- 8) The method according to claim 3, wherein said plurality of classifiers are arranged in a combination of serial and parallel configurations.
- 9) A system for determining the age category of a person comprising:
 - a) image capturing device, and
 - b) processing unit.
- 10) The system according to claim 9, wherein the examples of said image capturing device can be firewire or USB digital cameras.
- 11) The system according to claim 9, wherein said processing unit comprises one or multiple processors performing the age category classification.

12)The system according to claim 9, wherein the system further comprises means for processing the age category classification in real time, whereby the system carries out the processing at the same rate as the rate of image capture.